1969 OPERATING SUMMARY

NEWMARKET - E. GWILLIMBURY

water pollution control plant

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

Water management in Ontario

Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 195
Ontario

The operating efficiency and financial status of the water pollution control facilities operated for you in 1969 are presented in the following pages.

The regional operations engineer's comments and the statistical data will assist you in gauging the plant's level of performance. A new flow chart and up-to-date design data are also provided.

Various divisions and sections within the Commission have co-operated in providing what we trust is an accurate and concise annual operating summary.

D.S. Caverly,
General Manager.

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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NEWMARKET-EAST GWILLIMBURY

water pollution control plant

operated for

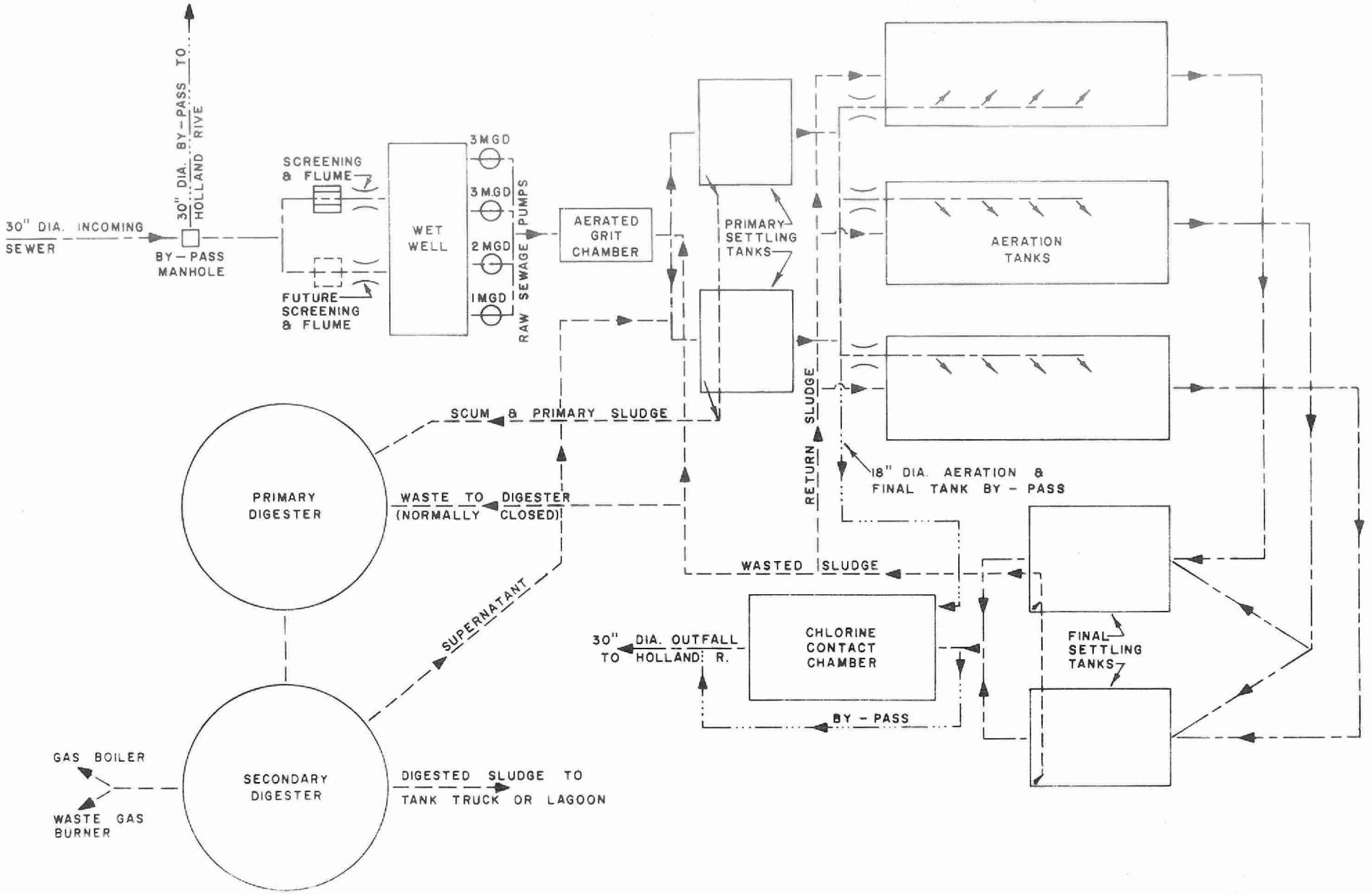
THE TOWN OF NEWMARKET

by the

ONTARIO WATER RESOURCES COMMISSION

1969 ANNUAL OPERATING SUMMARY

FLOW CHART


30" DIA. INCOMING SEWER
30" DIA. BY-PASS TO HOLLAND RIVE
BY-PASS MANHOLE
SCREENING & FLUME
FUTURE SCREENING & FLUME
WET WELL
3MGD
3MGD
2MGD
1MGD
RAW SEWAGE PUMPS
AERATED GRIT CHAMBER
PRIMARY SETTLING TANKS
AERATION TANKS
SCUM & PRIMARY SLUDGE
RETURN SLUDGE
18" DIA. AERATION & FINAL TANK BY-PASS
PRIMARY DIGESTER
WASTE TO DIGESTER (NORMALLY CLOSED)
WASTED SLUDGE
SUPERNATANT
30" DIA. OUTFALL TO HOLLAND R.
CHLORINE CONTACT CHAMBER
FINAL SETTLING TANKS
BY-PASS
GAS BOILER
WASTE GAS BURNER
SECONDARY DIGESTER
DIGESTED SLUDGE TO TANK TRUCK OR LAGOON

DESIGN DATA

PROJECT NO.	2-0087-61	TREATMENT	Activated Sludge
DESIGN FLOW	2.0 mgd	DESIGN POP. Newmarket E. Gwillimbury	9,200 10,000
BOD - Raw Sewage - Removal	220 mg/l 90%	SS - Raw Sewage - Removal	212 mg/l 90%

PRIMARY TREATMENT

Screening

- in East Channel; 1" spacing

Comminution

- Worthington (1)

Raw Sewage Pumps

Type: Smart Turner
Size: Two 1875 gpm @ 30' tdh
One 1560 gpm @ 30' tdh
One 1000 gpm @ 30' tdh

Grit Removal

Type: Aerated, grit removed by air lift
Size: Two 14.3' x 6' x 9.1' swd (9,700 gal)
Retention: 7 min
Air Supply: One Sutorbilt
130 scfm @ 8 psi

Primary Sedimentation

Type: Eimco
Size: Two 30' x 30' x 11.7' swd (131,000 gal)
Retention: 1.57 hr
Loading: Surface, 1110 gal/ft^2/day
Weir, 10,800 gal/ft/day

SECONDARY TREATMENT

Aeration Tanks

Type: Mechanical; single-pass
Size: Three 90' x 30' x 10.7' (107,500 cu ft or 0.67 mil gal)
Retention: 8.0 hr

Aerators

- Twelve Simcar

Secondary Sedimentation

Type: Eimco
Size: Two 35' x 35' x 13' swd (197,000 gal)
Retention: 2.4 hr
Loading: Surface, 840 gal/ft^2/day
Weir, 7,870 gal/ft/day

CHLORINATION

W & T

Chlorine Contact Chamber

Size: One 61.4' x 9' x 10.1' (34,800 gal)
Retention: 25 min

OUTFALL

- to Holland River

SLUDGE HANDLING

Digestion System - Two-stage

Primary --
Type: Gas mixed concrete
C.P. Lammert gas comp.
Size: One 40 dia x 21.25 swd (26,800 cu ft or 0.167 mil gal)
Loading: 2.9 lb/cu ft/mo

Secondary -- concrete

Size: One 40' dia x 23' swd (28,950 cu ft or 0.18 mil gal)
Total Loading: 1.4 lb/cu ft/mo

'69 REVIEW

EXPENDITURE

The operating cost for the year was $56,909.54, an increase of $10,019.94 over 1968. Areas of increased costs were payroll, power and chemicals. The plant staff was increased to four men. The unit cost of treating one million gallons in 1969 was $93.00. In 1968, the unit cost was $88.24.

PLANT FLOWS and CHLORINATION

In 1969, the plant treated an average flow of 1.7 mgd. This is an increase of 16 percent over the 1968 average and corresponds with the gradual upward trend of the previous three years. The design flow of 2 mgd was exceeded 16 percent of the time. The final effluent was disinfected with 15,484 lbs. of chlorine between May 3 and November 8 to give a residual of 0.5 milligrams per litre after 15 minutes.

PLANT EFFICIENCY

The average raw sewage BOD and suspended solids concentrations were 198 mg/l and 304 mg/l respectively. These loadings are similar to those in previous years. Average BOD and suspended solids reduction efficiencies were both 96 percent and represent excellent treatment.

A total of approximately 45 tons of BOD and 65 tons of suspended solids was removed during the year. The final effluent concentrations of 7 mg/l BOD and 13 mg/l suspended solids compare favourably with OWRC objectives of 15 mg/l for each.

A total of 855 cubic feet of grit was removed from the raw sewage. This total represents an average of 1.4 cubic feet of grit per million gallons of raw sewage treated, which is normal.

AERATION

The average concentration of the primary effluent directed to the aeration tanks was 110 mg/l BOD and 126 mg/l suspended solids. The average mixed liquor suspended solids concentration in the aeration tanks was 1,980 mg/l. The food/micro-organism ratio averaged 0.12, which was within the limits of good aeration tank operation.

SLUDGE DIGESTION and DISPOSAL

A total of 3,170,000 gallons of raw sludge was pumped to the digester . The raw sludge averaged 4.8 percent total solids of which 57 percent was volatile matter. Digested sludge averaged 5.5 percent total solids, of which 44 percent was volatile. The average reduction in volatile matter was approximately 50% which indicates satisfactory digestion. A total of 7,164 cubic yards of digested sludge was hauled from the digester by tank truck.

GENERAL

There was no major mechanical breakdown during the year. Some trouble was experienced with the aeration units and the final drive bearing was replaced in three of the gear boxes. The interior of the control building was painted and this has greatly improved its appearance.

CONCLUSIONS

The project is operating very efficiently at flows approaching the design capacity of 2.0 mgd.

PROJECT COSTS

BOTH STAGE IIs

NET CAPITAL COST (Final)

Newmarket		$700,694.82	
DEDUCT - Payments from Municipality	$ 90,000.00		
- Portion financed by CMHC/MDLB (Final)	449,521.34	539,521.34	
Long Term Debt to OWRC			$161,173.48
East Gwillimbury		$284,099.63	
DEDUCT - Payments from Municipality		284,099.63	
Long Term Debt to OWRC			$ Nil

Debt Retirement Balance at Credit (Sinking Fund) December 31, 1969

Newmarket	$ 22,104.08
E. Gwillimbury	$ Nil

BILLINGS

	Newmarket	E. Gwillimbury	
Net Operating	$39,836.68	$17,072.86	$ 56,909.54
Debt Retirement	3,252.00	-	3,252.00
Reserve	4,680.14	2,006.18	6,686.32
Interest Charged	9,023.28	-	9,023.28
	$56,792.10	$19,079.04	$ 75,871.14

RESERVE ACCOUNT

Balance @ January 1, 1969	$22,838.73	$ 9,789.19	$32,627.92
Deposited by Municipalities	4,680.14	2,006.18	6,686.32
Interest Earned	1,078.40	601.58	1,679.98
	$28,597.27	$12,396.95	$40,994.22
Less Expenditures	5,655.53	2,423.80	8,079.33
Balance @ Dec. 31, 1969	$22,941.74	$ 9,973.15	$32,914.89

BOTH STAGES I and III

NET CAPITAL COST (Final)

Newmarket	$100,259.96	
DEDUCT - Portion financed by CMHC/MDLB (Final)	63,826.81	
Long Term Debt to OWRC		$36,433.15
East Gwillimbury	$ 23,980.94	
DEDUCT - Payment from Municipality	23,980.94	
Long Term Debt to OWRC		$ Nil

Debt Retirement Balance at Credit (Sinking Fund) December 31, 1969

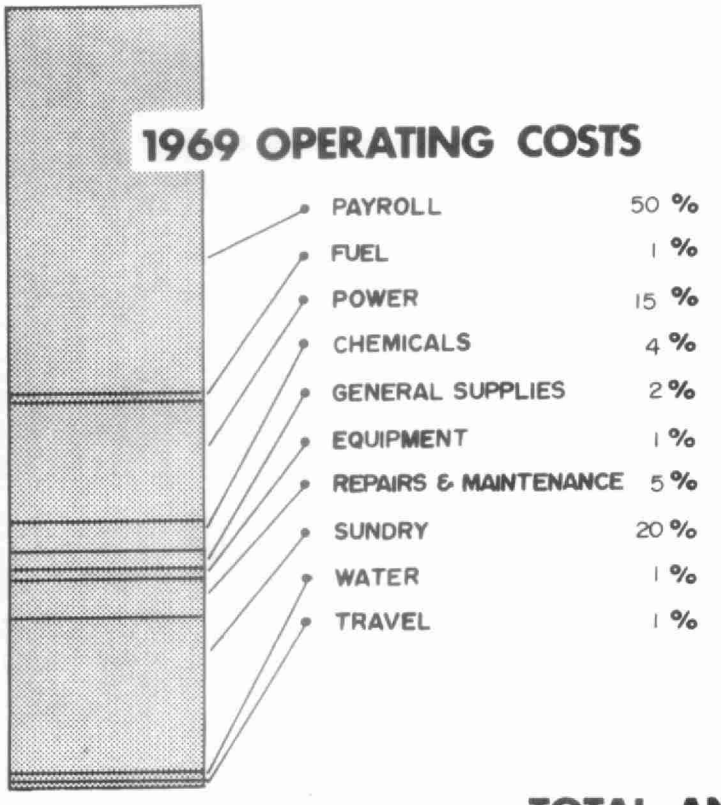
Newmarket	$ 5,991.45
E. Gwillimbury	$ Nil

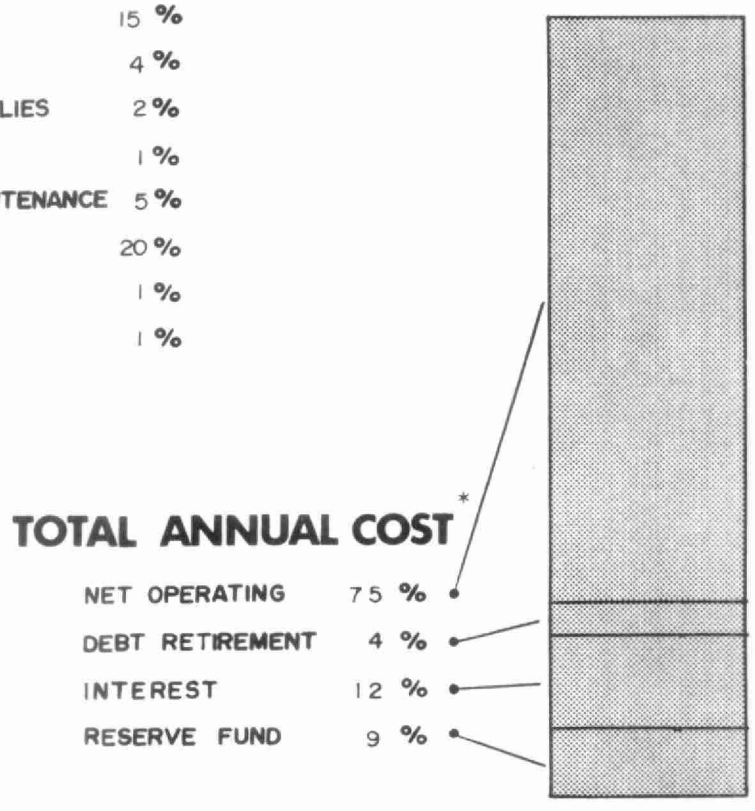
BILLINGS

	Newmarket	E. Gwillimbury	
Debt Retirement	$ 735.00	$ Nil	$ 735.00
Reserve	483.15	120.38	603.53
Interest Charged	2,039.71	Nil	2,039.71
	$3,257.86	$120.38	$3,378.24

RESERVE ACCOUNT

	Newmarket	E. Gwillimbury	
Balance @ Jan. 1, 1969	$4,266.89	$1,060.63	$5,327.52
Deposited by Municipalities	483.15	120.38	603.53
Interest Earned	253.41	63.03	316.44
	$5,003.45	$1,244.04	$6,247.49
Less Expenditures	-	-	-
Balance @ Dec. 31, 1969	$5,003.45	$1,244.04	$6,247.49





Yearly Operating Costs

YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1965	476.23	$32,566.48	$68.38	4 cents
1966	547.45	38,546.14	70.41	4 cents
1967	606.46	39,215.29	64.66	4 cents
1968	531.39	46,889.60	88.24	5 cents
1969	612.10	56,909.54	93.00	5 cents

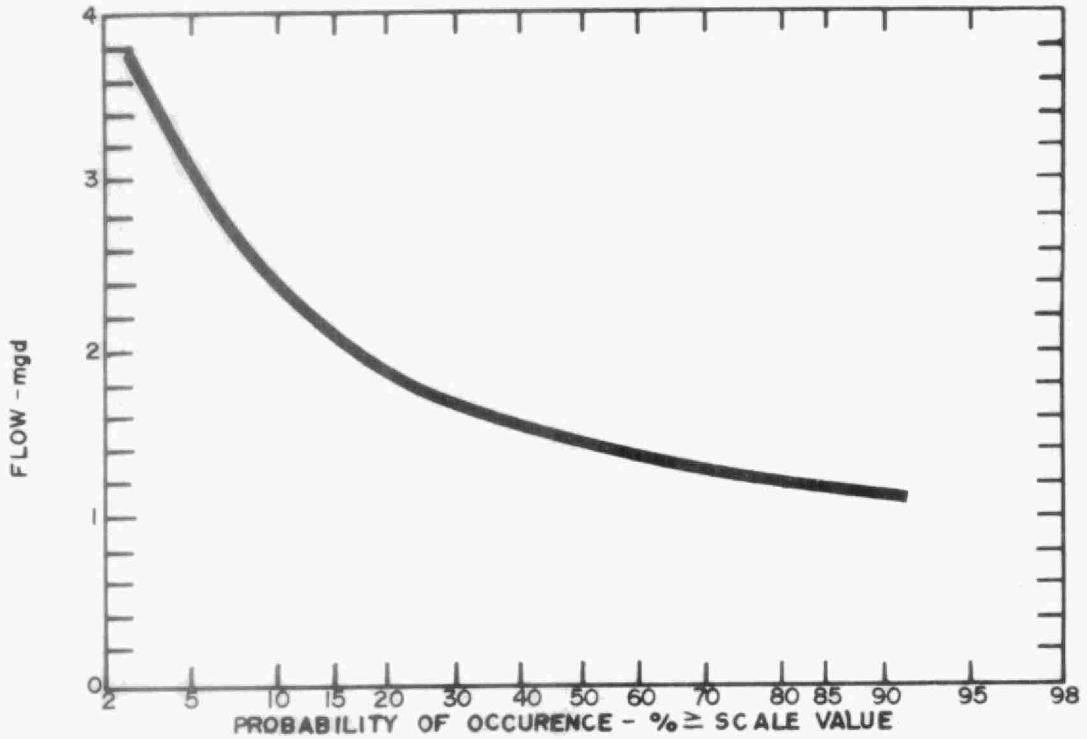
* Both Stage IIs only

Monthly Operating Costs

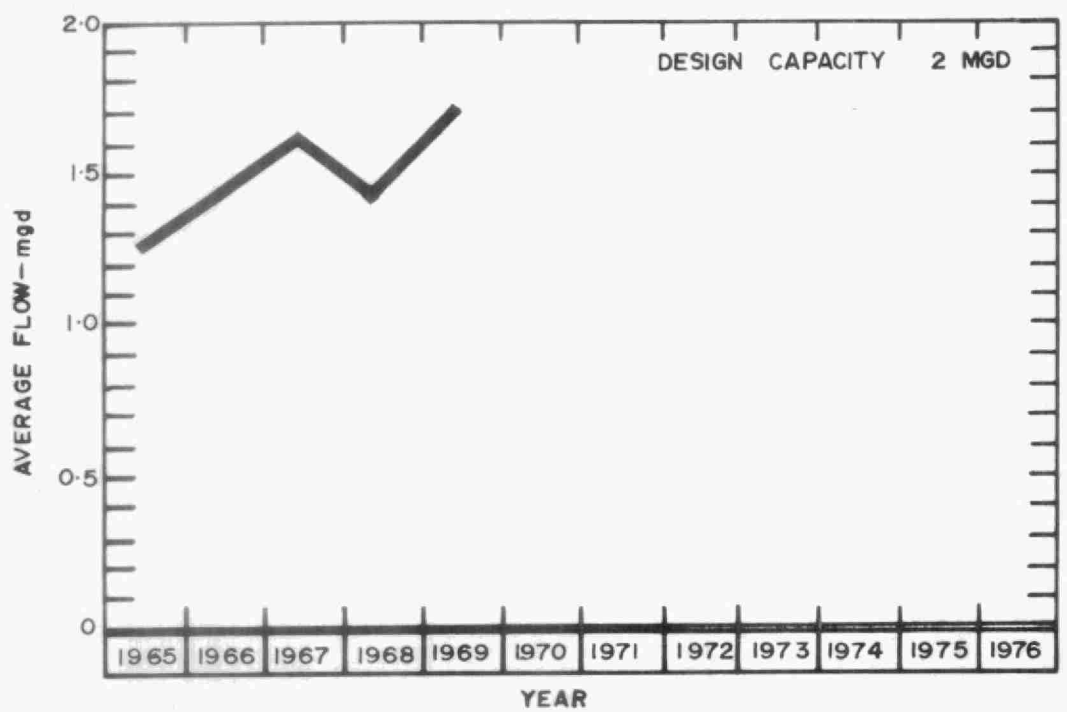
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY *	WATER	TRAVEL
JAN	3998.40	3113.45	-	112.89	645.42	-	41.19	-	43.90	22.35	-	19.20
FEB	2965.19	2101.02	-	-	-	-	112.45	27.00	214.20	456.67	30.00	23.85
MAR	4668.52	2101.02	-	108.93	1161.84	-	63.36	-	538.42	674.70		20.25
APR	3758.28	2241.30	-	-	660.79	-	143.36	-	135.05	487.83	70.00	19.95
MAY	4150.14	2420.65	-	-	635.05	45.78	82.12	84.80	328.89	527.35	-	25.50
JUNE	2937.23	2128.65	-	-	-	-	117.24	-	46.05	560.09	60.00	25.20
JULY	6092.78	2147.50	334.09	120.00	783.64	1242.67	122.63	483.83	224.79	583.53	30.00	20.10
AUG	4861.72	3177.71	208.96	-	713.21	-	75.57	-	107.17	508.50	40.00	30.60
SEPT	4805.46	2173.84	-	-	814.95	621.34	162.86	-	403.98	572.39	30.00	26.10
OCT	8058.16	2115.63	-	-	811.78	621.34	139.14	23.16	412.04	3907.62	-	27.45
NOV	3041.72	2116.11	-	-	709.93	-	28.00	-	6.62	115.96	-	65.10
DEC	7546.88	2150.96	-	-	1623.11	-	155.44	-	182.00	3206.58	90.00	163.85
TOTAL	56909.54	27987.84	543.05	341.82	8559.72	2531.13	1243.36	618.79	2643.11	11623.57	350.00	467.15

* SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE $6228.00

PROCESS DATA



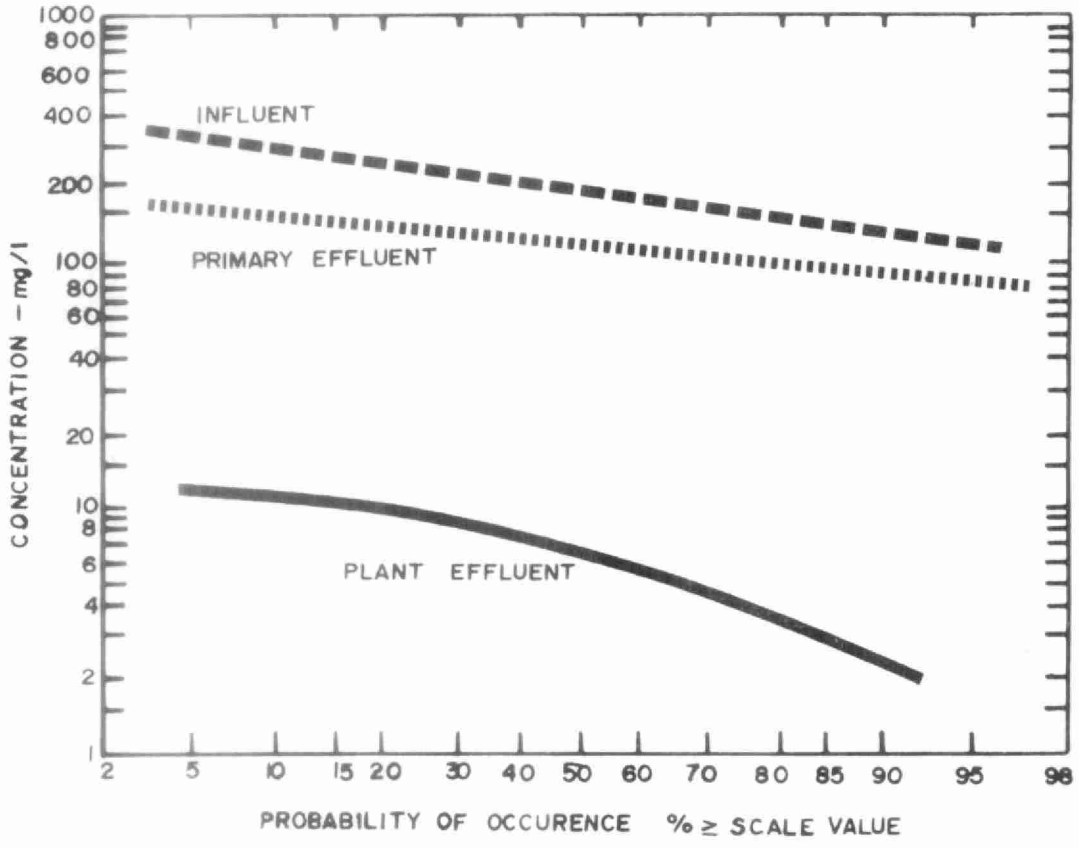
FLOWS



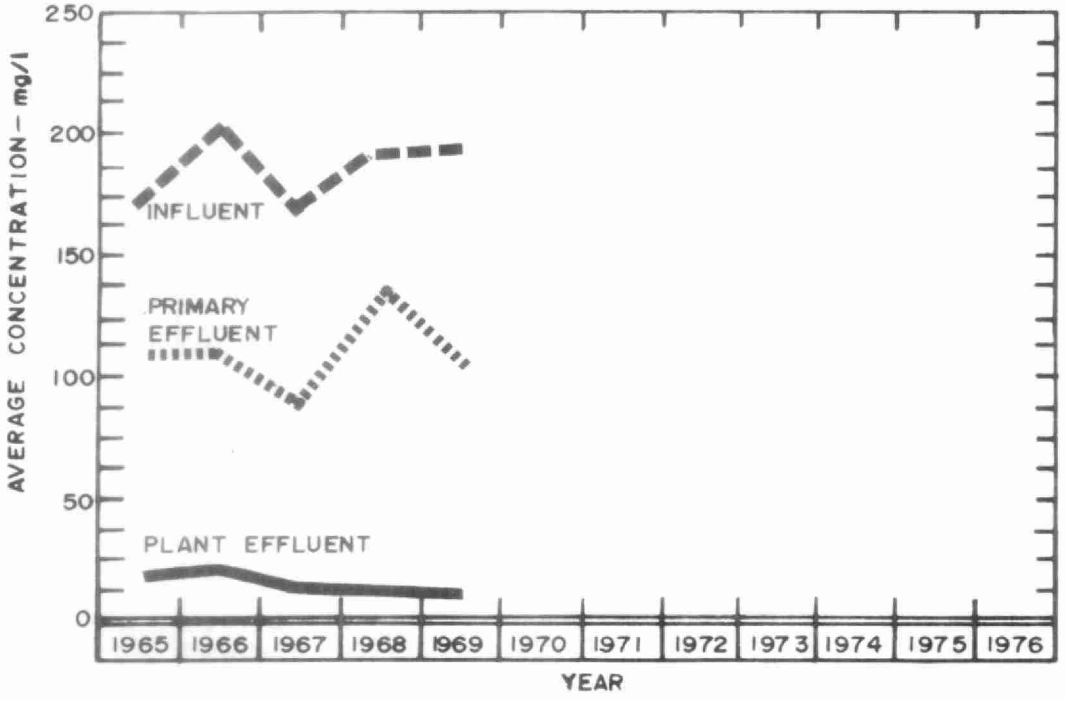
PLANT FLOWS and CHLORINATION

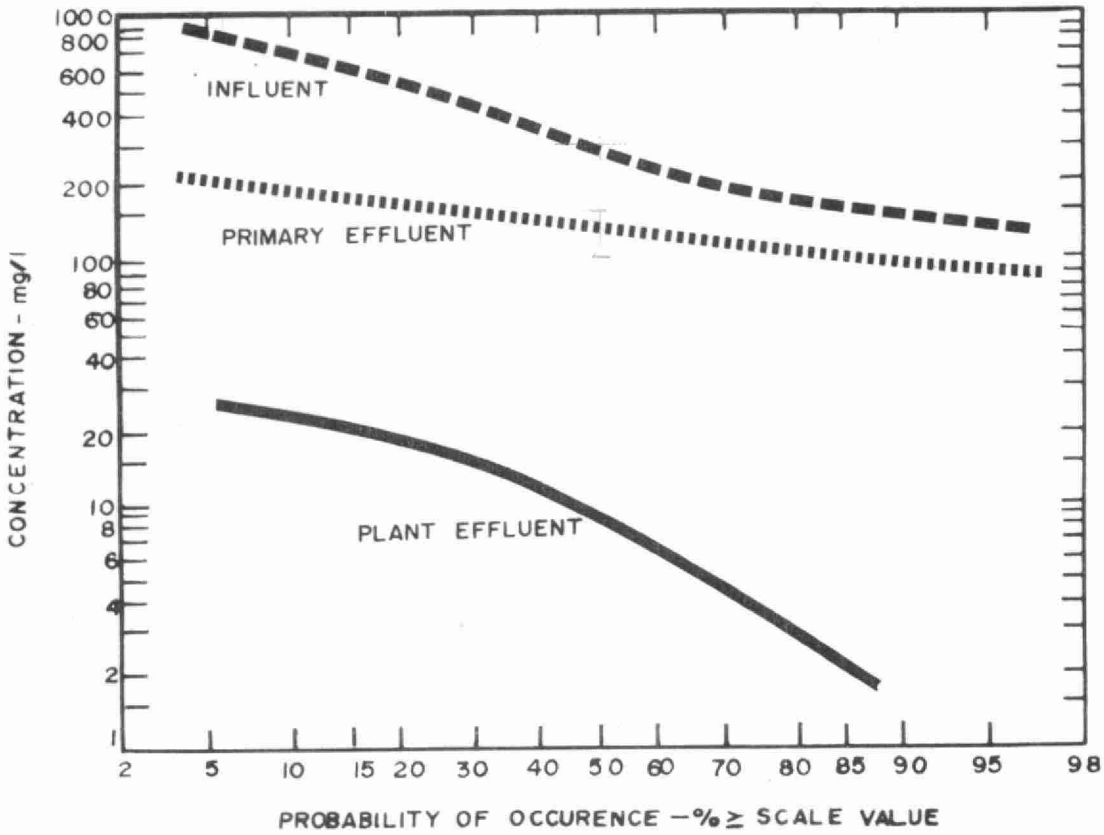
MONTH	TOTAL FLOW mil gal	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED 10^3 pounds	DOSAGE mg/l
JAN	52.3	1.6	5.6	1.0	0	0
FEB	42.2	1.5	1.7	1.3	0	0
MAR	60.9	2.0	4.7	1.4	0	0
APR	71.4	2.4	7.0	1.9	0	0
MAY	84.3	2.7	8.8	1.5	2.12*	2.5
JUNE	44.5	1.5	1.8	1.2	2.51	5.6
JULY	49.7	1.6	4.1	1.0	2.54	5.1
AUG	39.4	1.3	2.0	1.0	2.51	6.4
SEPT	37.2	1.2	1.7	1.1	2.52	6.8
OCT	40.9	1.3	1.6	1.1	2.68	6.6
NOV	44.8	1.5	2.6	1.2	.61*	5.4
DEC	44.5	1.4	1.7	1.3	0	0
TOTAL	612.1	-	-	-	15.49	-
AVERAGE	-	1.7	-	-	1.58	5.0

* Chlorination between May 3 and November 8.

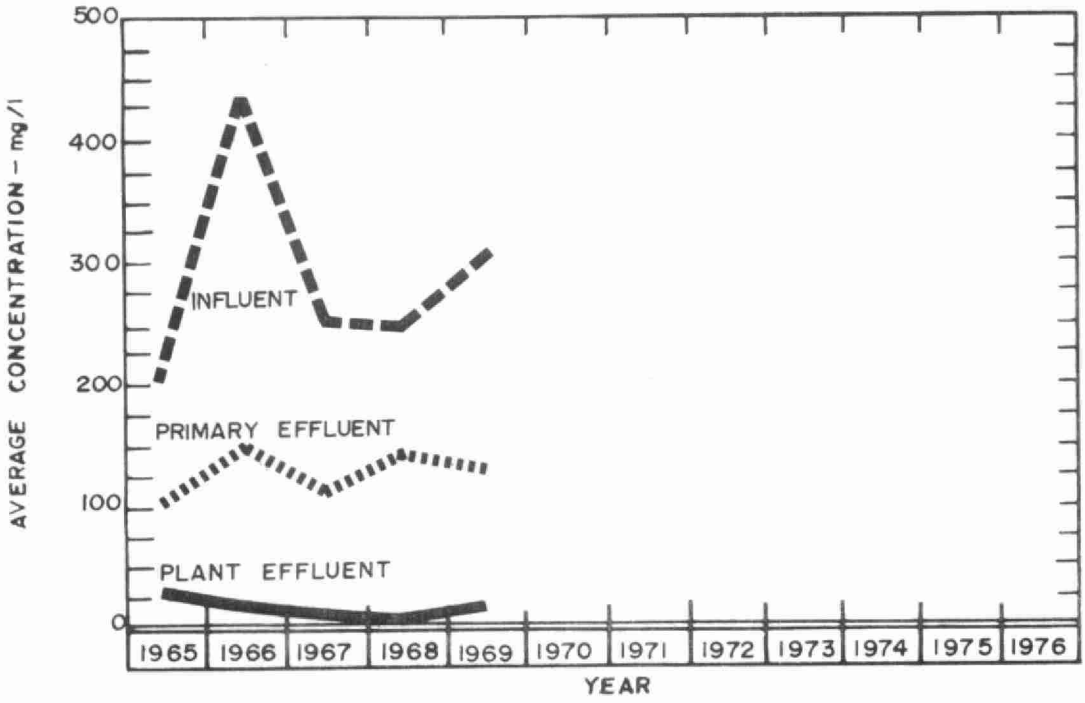


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS

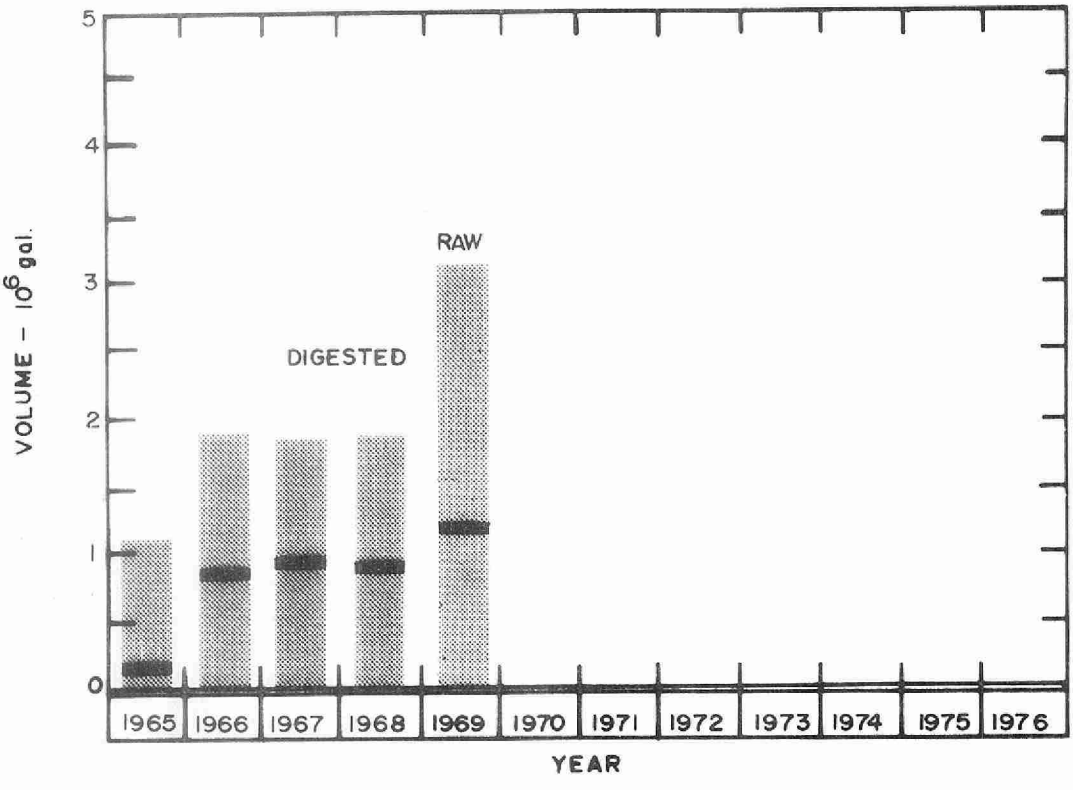


PLANT EFFICIENCY

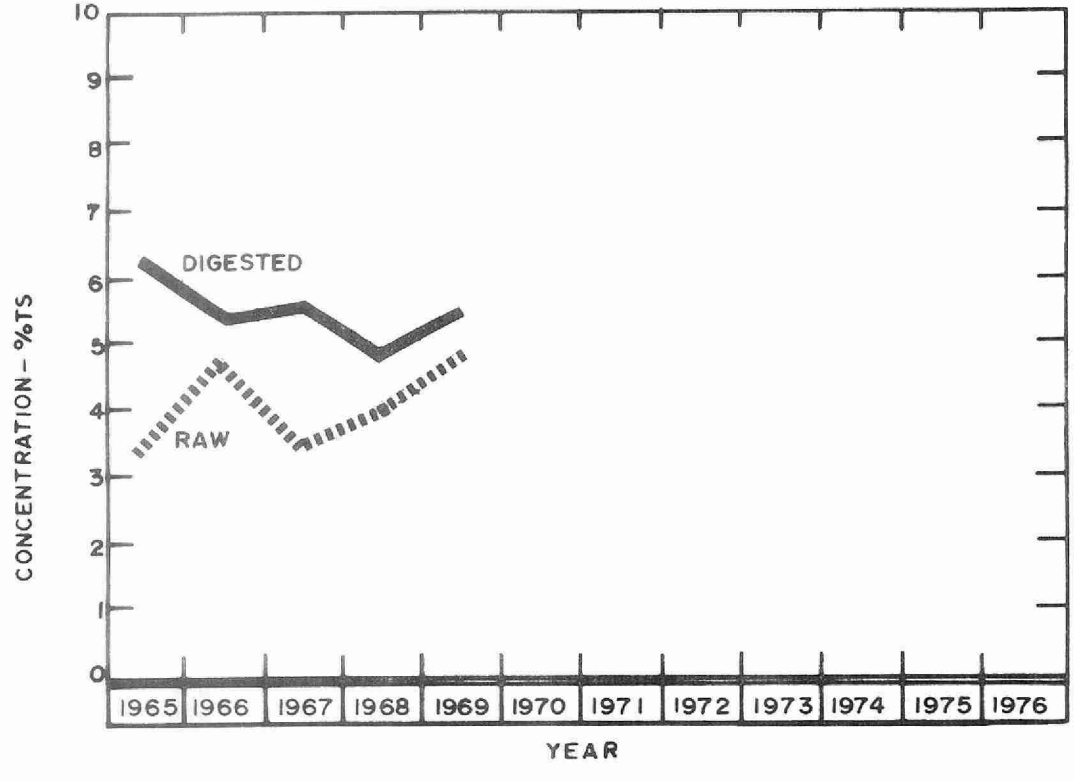
MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT REMOVAL
	INF.	EFF.	REDUCTION		INF. CONCN	EFF. CONCN	REDUCTION		
	mg/l	mg/l	%	10^5 pounds	mg/l	mg/l	%	10^5 pounds	cu ft
JAN	220	6	97	1.1	200	5	98	1.0	76
FEB	190	9	95	.8	180	10	94	.7	58
MAR	110	7	94	.6	120	10	92	.7	75
APR	140	12	91	.9	140	30	79	.8	99
MAY	110	3	97	.9	140	10	93	1.1	84
JUNE	240	9	96	1.0	520	5	99	2.3	59
JULY	-	-	-	-	-	-	-	-	-
AUG	247	3	99	1.0	360	5	99	1.4	90
SEPT	230	6	99	1.0	360	15	97	2.1	62
OCT	200	6	97	.8	210	10	95	1.2	60
NOV	185	9	95	.8	290	20	93	1.2	60
DEC	305	9	97	1.3	620	20	97	2.7	62
TOTAL	-	-	-	-	-	-	-	-	855
AVERAGE	198	7	96	.9	304	13	96	1.3	71

AERATION

MONTH	AVG DAILY FLOW mil gal	AERATION INF.		SECONDY. EFF.		MLSS CONCN mg/l	F/M lb BOD / lb MLSS
		BOD mg/l	SS CONCN mg/l	BOD mg/l	SS CONCN mg/l		
JAN	1.7	-	-	6	5	1820	-
FEB	1.5	95	90	9	10	1880	.10
MAR	2.0	90	100	7	10	2240	.11
APR	2.4	95	110	12	30	2830	.11
MAY	2.7	90	115	3	10	2240	.15
JUNE	1.5	120	130	9	5	1960	.12
JULY	1.6	-	-	-	-	1780	-
AUG	1.3	93	127	3	5	1950	.08
SEPT	1.2	145	145	6	15	1820	.13
OCT	1.3	120	100	6	10	2110	.10
NOV	1.5	135	190	9	20	1860	.14
DEC	1.4	115	155	9	20	1300	.12
TOTAL	-	-	-	-	-	-	-
AVERAGE	1.7	110	126	7	13	1980	.12


VOLUME - 10^6 gal.
5
4
3
2
1
0
RAW
DIGESTED
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
YEAR

DIGESTION


CONCENTRATION - %TS
10
9
8
7
6
5
4
3
2
1
0
DIGESTED
RAW
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
YEAR

SLUDGE DIGESTION and DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME 10^5 gal	TOTAL SOLIDS %	VOL SOLIDS %	VOLUME 10^5 gal	TOTAL SOLIDS %	VOL SOLIDS %	VOLUME 10^5 gal	TOTAL SOLIDS %	DEWATERED cu yd	LIQUID cu yd
JAN	1.9	4.0	66	1.1	3.8	49	-	-	0	650
FEB	2.0	-	-	1.1	-	-	-	-	0	630
MAR	2.3	-	-	.2	-	-	-	-	0	130
APR	2.3	5.7	51	.9	7.8	34	-	-	0	560
MAY	2.3	2.6	63	.9	8.7	32	-	-	0	550
JUNE	2.4	4.0	53	.9	4.8	35	-	-	0	560
JULY	3.4	-	-	.9	-	-	-	-	0	560
AUG	3.7	4.5	54	.9	6.4	56	-	-	0	540
SEPT	3.7	7.8	45	1.2	4.3	49	-	-	0	694
OCT	3.1	4.8	60	1.3	4.0	46	-	-	0	770
NOV	2.2	4.8	62	1.3	4.3	50	-	-	0	780
DEC	2.4	-	-	1.2	-	-	-	-	0	740
TOTAL	31.7	-	-	11.9	-	-	-	-	0	7164
AVERAGE	2.6	4.8	57	1.0	5.5	44	-	-	0	597

Water management in Ontario